PSEUDO-TUMORAL LUNG FORMATIONS FROM SILICA FREE DUSTS

LUCIANO ROMEO • L. Perbellini • P. Apostoli • F. Malesani
Institute of Occupational Medicine, University of Verona, Italy

INTRODUCTION

In our experience we have encountered some workers who exhibited round shaped opacities in their lung suspected as being neoplastic in nature. In certain cases it was possible to exclude malignancy of such lesions, identifying them on the contrary, as the results of prolonged inhalation of silica free dusts at work.

In this work we report four cases exposed to calcium and magnesium salts (as previously stated) and one case of talc exposure, recently observed, who exhibited these types of lesions.[5]

SUBJECTS AND METHODS

Our study was carried out on five patients: four were magnesium and barium hydroxide production workers and one was a natural rubber processing operator. The first four subjects were allocated in the same industry and had done various tasks in two departments:

1. magnesium production employing heat processing (Pidgeon system), using dolomite, ferrosilicon and calcium fluoride as raw materials;
2. barium hydroxide production employing "Soderbergher" furnaces, by use of barium carbonate.

In the first department the enviromental dust level was between 1.6 and 71.3 mg/m^3 and in the second one from 0.8 to 128 mg/m^3.

The four workers between the ages of 43 and 58, had worked in the two departments for long periods (from 17 to 34 years). Their chest X-ray films were very similar and presented coin shaped lesions measuring 1–2 cm in diameter, single in three cases and multiple in one. Only one case was also a pneumoconiosis suspect with reticular shadows. In two workers the coin shaped lesions were found 3–4 years before.

We had suspected the presence of secondary neoplasm of the lung but as it proved impossible to locate the primary site of neoplasm, in spite of accurate investigations, chest X-ray film follow-ups were suggested.

In three of the four subjects the coin lesions remained unchanged at every follow-up for five years. In the fourth subject, after three years, the two shadows originally identified had increased about 30% in diameter reaching a dimension of 3 and 1.5 cm respectively. We therefore proceeded with a toracotomy which permitted removal of a sub-pleural well encapsulated node.

On cryoscopy it was described as: "fibrous wall node with signs of chronic inflammation and a central area of necrosis." The hystological examination revealed:" well defined node of lung parenchyma consisting essentially of interwoven and whirl-pool-like collagen fibers, free of identifiable cells, and minute calcified particles. The surface area of the node is rich in fibrocytes, newly formed vessels, clusters of lymphoplasmocytic cells and occasional foreign body multinucleated giant cells."

Mineralogical studies on the node employing X-ray diffraction, neutronic activation, and X-ray fluorescence showed scarse presence of silica and no significant concentrations of any specific metals. The Debye X-ray diffraction revealed this node as being rich in calcium and magnesium diphosphate.

The subjects maintained good health and showed no further lesions of the lung whatsoever on radiological investigations.

The fifth worker, 45 years old, had worked in a department for the processing of natural rubber where according to the requirements for production, dust of talc, mica and fecula were alternatively used.

The results of enviromental investigation carried out to determine the type and quality of corpuscolar pollution showed a variation of 0.6 and 1.4 mg/m^3 of dust concentration.

Microscopic examination of the particles removed revealed that the dust was rich of fibers 1–2 μm in diameter, 80% 10–20 μm in length and 20% less than 10 μm long. Fecula consisted of particles less that 5 μm in diameter which under polarized light had the typical "malta cross" appearance. Lastly, mica consisted of lamellae ranging from 20 to 60 μm in size. No asbestos fibers or silica was found.

The patient gave no history of respiratory or other diseases. All at once, a few days before admission, the subject had slight fever, cough and exertional dyspnoea. The chest X-ray film showed presence of an irregular digitated shadow, 3.5 cm in diameter, at the base of the left lung.

All the various investigations carried out were negative. Between thirty and ninety days after, other coin shaped shadows appeared bilaterally, becoming larger and more numerous, tending to be confluent.

The rapid growth of the lesions in the lung compared to the satisfactory clinical state of the patient, led us to proceed with a toracotomy.

The cryoscopic examination of the heaviest mass which was first localized at the base of the left lung, ruled out any presence of neoplasm.

The histological examination reported: "Lung parenchyma greatly altered by wide-spread granulomatose inflammation consisting of epithelioid cells and numerous foreign body giant cells, containing birefrangent needle-like fibers 1-2 μm in length and asteroid bodies."

In conclusion the histological diagnosis was "giant cell talc granulomatosis of the lung."

The results of the study made on the material used by the patient at work confirm that the needle-like formations seen in cytoplasm of the giant cells were talc fibers and one may assume that the asteroid bodies were, on the contrary, fecula granules.

The postoperative course was normal and his overall condition improved. In addition, within the following months a slow but constant regression of the shadows was observed and seven months later only rare radiological irregular opacities were seen. Two years later the chest X-ray film was normal apart from the signs of the toracotomy.

DISCUSSION

The description of pseudo-tumoral lung formations from silica free dusts is rare in literature.[2,4]

Although coin lesions of the lung due to inhalation of calcium and magnesium salts have not been reported, scientific studies have described talc granulomas of the lung and other organs.[3,5,6,7,8]

With regards to the first four cases we have described among the raw materials used at work, dolomite results the most suspected responsible for round shaped opacities of the lung.[1]

The rapid development and progression of talc granulomatosis found in our rubber worker and its disappearance after he stopped work was probably due to reversible flogistic-proliferative tissue reaction, without fibrosis, from talc free of silica or asbestos fibers.

Hence, in the presence of lung lesions, in particular those we have described, it seems beneficial to add to routine clinical and instrumental practice suitably deeper investigation into work history of subjects, possibly including analysis of work environment and raw materials in use.

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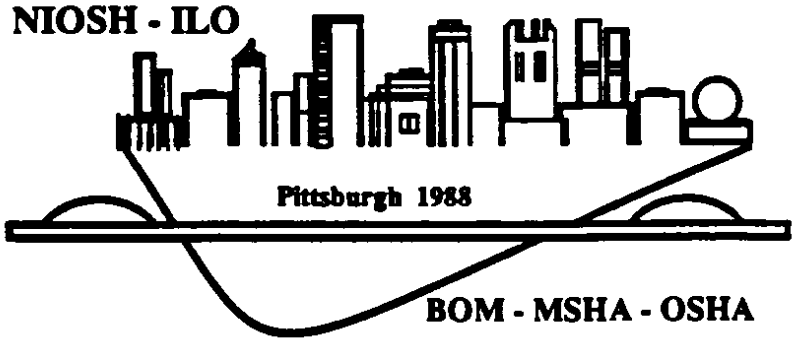

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